

REMARKS

Claims 1, 3, 5 and 9 to 11 are pending in the application. Claims 6 to 8 of non-elected species (a) of Group I of the restriction requirement are withdrawn from consideration.

Claims 12 to 15 of non-elected Group II of the restriction requirement have been canceled without prejudice to the filing of a divisional patent application directed to the subject matter of non-elected claims 12 to 15.

If independent claim 1 is found allowable, it is respectfully requested that withdrawn dependent claims 6 to 8, which depend directly or indirectly from independent claim 1, be rejoined to the application.

Claim Amendment

Claim 1

Independent claim 1 has been amended to include the limitations of original, now canceled, dependent claim 2.

§103

Claims 1 to 4 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 2001-342543 to Tsutomu.

Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 2001-342543 to Tsutomu in view of U.S. Patent No. 6,224,689 to Koo and Japan No. 2002-020838 to Tsutomu.

Claims 9 to 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 2001-342543 to Tsutomu in view of Japan No. 2002-020838 to Tsutomu.

These rejections, as applied to the amended claims, are respectfully traversed.

Patentability

Japan No. 2001-342543 (A1) ("JP '543")

Conventionally, (Ti, Nb) N is refined by using Mg oxides and uniformly dispersed voids are formed at the punched cross-sectional area for preventing stress concentration at hole expansion work and improving hole expandability. However, it is difficult to obtain the appropriate dispersion state because of a low oxygen reaction because of only controlling oxides and the lower amount of oxygen because of using free oxygen after deoxidization.

The present invention targets to control the amount of O, Mg, Mn, S under the conditions of equations of (1), (2) and (3) for finely dispersing (Ti, Nb) N and Mg oxides using Mg sulfides. Mg, in accordance with the present invention, must satisfy equation (1) to provide a large enough quantity of Mg sulfides. Specification, page 13, lines 17 to 26.

On the other hand, JP '543 uses only Mg oxides, and complex oxides such as MgO and one or more of Al₂O₃, SiO₂, MnO and Ti₂O₃ containing MgO. Therefore, JP '543 does not disclose or suggest a refinement of (Ti, Nb) N using Mg sulfides. As a result, the present invention is not disclosed or suggested by JP '543.

Japan No. 2002-020838 (A2) ("JP '838")

JP '838 does not disclose or suggest the characteristic features of the present invention which control the amount of O, Mg, Mn, S under the conditions of equations of (1), (2) and (3) for finely dispersing (Ti, Nb) N and Mg oxides using Mg sulfides. JP '838 also does not disclose or suggest O and S.

Therefore, the controlling process of the above mentioned features according to the present invention is not disclosed or suggested by JP '838.

United States Patent No. 6,224,689 (A3) (“US ‘689”)

US ‘689 only discloses that Mg is added to form finely dispersed oxide grains and to prevent coarsening the grains. Col. 8, lines 32-45. However, US ‘689 does not disclose or suggest the characteristic features of the present invention which control the amount of O, Mg, Mn, S under the condition of equations of (1), (2) and (3) for finely dispersing (Ti, Nb) N and Mg oxides using Mg sulfides. US ‘689 also does not disclose or suggest O and S. Therefore, the controlling process of the above mentioned features according to the present invention is not disclosed or suggested by US ‘689.

A characteristic feature of the present invention is, as described above, to control O and S for preventing a formation of MnS precipitates which lowers hole expandability, and to form nuclei of (Ti, Nb) N by means of MgS precipitation, and to restrain a growth of (Ti, Nb) N for improving hole expandability. Attached Fig. A shows a comparison data of the hole expandability property among the present invention, A1 (JP ‘543) and A2 (JP ‘838). As clearly seen from Fig. A, the hole expandability property of the present invention is superior than A1 and A2.

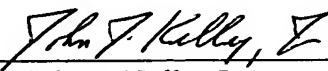
It is therefore submitted that amended independent claim 1, and all claims dependent thereon, are patentable over Japan No. 2001-342543, Japan No. 2002-020838 and/or U.S. Patent No. 6,224,689.

CONCLUSION

It is submitted that in view of the present amendment and foregoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application, as amended, be allowed and passed for issue.

Respectfully submitted,

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